Urinary 8-OHdG as a Non-Invasive Biomarker of Oxidative Stress in Metabolic Syndrome (MetS)

ABSTRACT

Chronic diseases such as diabetes, cancer, atherosclerosis, stroke, and cardiovascular diseases are often a result of oxidative stress. Oxidative stress occurs due to an imbalance between the rates of generation of Reactive Oxygen Species (ROS) and clearance by the antioxidant mechanisms in the body, sometimes leading to interaction with biomolecules such as proteins and DNA. One of the critical metabolite of oxidative stress is 8-hydroxy-2’-deoxo-guanosine (8-OHdG), which is a DNA adduct. Higher levels of which can escape the DNA repair and result in point mutations. This study attempted to evaluate use of 8-OHdG levels in spot urine samples in young adults with and without Metabolic Syndrome (MetS) as a non-invasive method. First year college students (n=376), average age 19.8 years), attending Kentucky State University, Frankfort, with no prior diagnosis of illness participated in the cross sectional study. Anthropometric screenings included measurement of height, weight, waist circumference, and body mass index. The clinical screenings included measurement of blood pressure and determination of fasting lipid and glucose concentrations. The National Cholesterol Education Program’s Adult Treatment Panel III (NCEP ATP III) and International Diabetes Federation (IDF) definitions for MetS were applied. 8-OHdG concentration levels were measured by Enzyme Linked Immunosorbent Assay (ELISA). Analysis of variance (ANOVA) scores on the Means were used to examine differences between genders for all parameters. Correlation of Means (p ≤ 0.05) was used to determine significant correlation. Prevalence rate of MetS based on NCEP ATP and IDF definitions were found to be 12% and 9% respectively. Of the various Mets criteria, only high blood pressure correlated with higher urinary levels of 8-OHdG. The study indicates the possibility of using 8-OHdG as a marker of oxidative stress, however, analysis using a 24-hour urine sample is desirable.